Outdoor Lighting
California Energy Efficiency Standards 2005

Parking Lot Lighting

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Description

- Establishes maximum LPD and control requirements.
- Maximum LPD varies according to the four lighting zones (.04 in LZ1 to 0.20 in LZ4).
- Control must be able to reduce lighting by at least 50% during curfew, besides daytime turnoff
- For lamps > 50 watts, efficacy " 60 lumens/watt.
- Cutoff or full cutoff luminaires are required.

Design Criteria

- Based on IESNA RP-20-98 “Lighting for Parking Facilities.”
- The basic category represents typical parking lot conditions.
- The enhanced security category is for situations where personal security is a problem, or is likely to be a problem.

Design Criteria (cont.)

- Minimum horizontal illuminance (fc).
- Minimum vertical illuminance (fc).
- Uniformity ratio (max to min horizontal fc).
- Lighting design criteria is selected for the four lighting zones:
  - LZ1 = 1/2 LZ2 levels.
  - LZ2 = Basic.
  - LZ3 = Enhanced security.
  - LZ4 = Double enhanced security level.

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Design Criteria Table

Lighting Zone	Minimum Horizontal Illuminance	Minimum Vertical Illuminance (5 ft above pavement)	Horizontal Illuminance (max/min ratio)
1	0.1	n. a.	20:1
2	0.2	0.1	20:1
3	0.5	0.25	15:1
4	1.0	0.50	10:1

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Lighting Equipment

Lamps and ballasts:

- Metal Halide lamps, horizontal burn position.
- Mean lumens.
- CWA ballasts.

Luminaires:

- IESNA type V, full cutoff.
- Light loss factor of 0.70.

Poles:

- 20 ft, 25 ft, 30 ft and 35 ft.

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Lighting Models

- Models based on typical parking lot dimensions.
- LPD is calculated based on the area assigned to each light pole.

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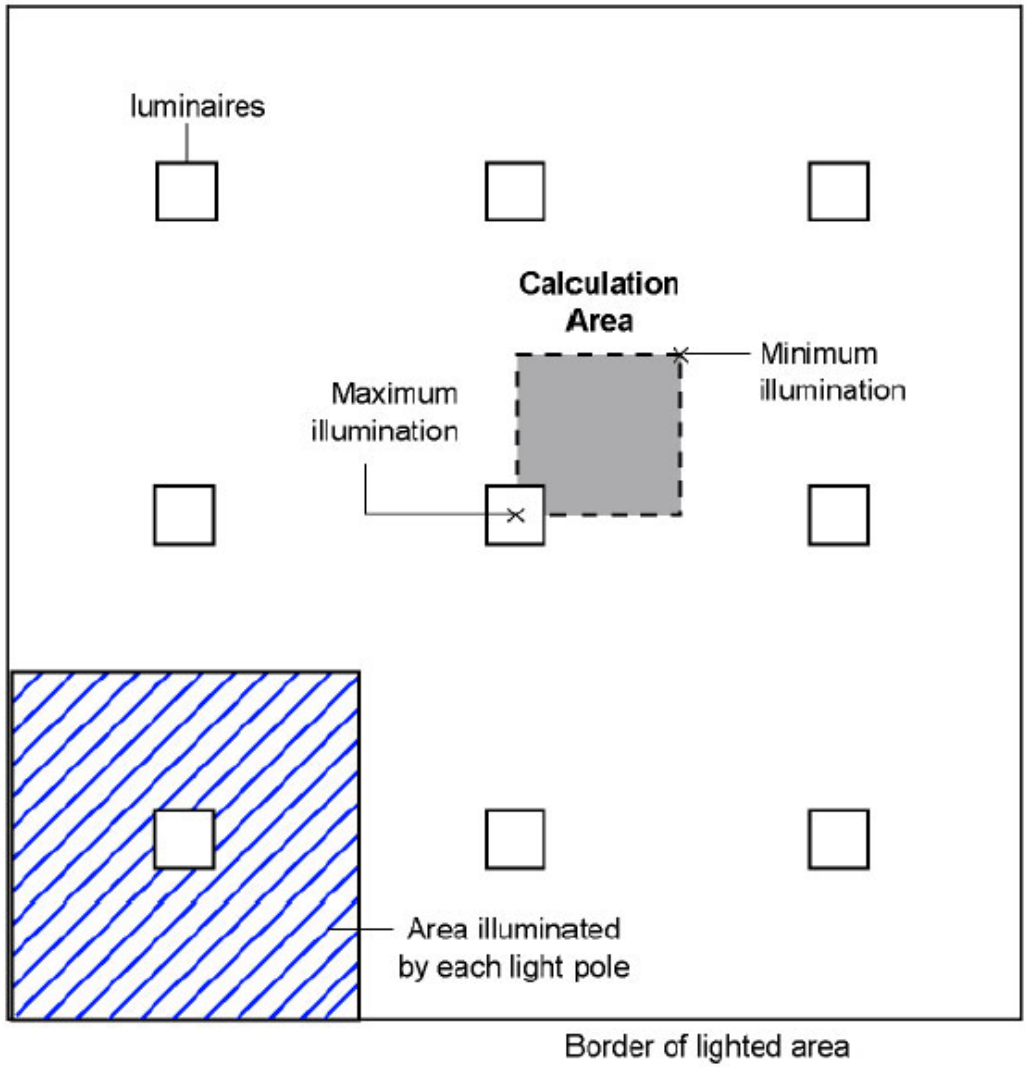
Calculation Grid for Parking Lots



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Calculations

- Used Lighting Analysts AGI-32 v1.5 software.
- Initial design is based on “common” pole heights, lamp wattages, and pole spacing.
- Initial criteria to meet are average illuminance and minimum vertical illuminance (adjust wattage and spacing).
- If not met, check uniformity and adjust.
- Minimum vertical illuminance is very hard to meet, especially in LZ1.

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Calculations Table

		LZ1	LZ2	LZ3	LZ4
Lighting Power Density	Recommended Criteria	0.040	0.060	0.080	0.200
	Calculated	0.037	0.052	0.079	0.194
Minimum Horizontal	Criteria	0.1	0.2	0.5	1.0
	Calculated	0.1	0.2	0.6	1.2
Minimum Vertical	Criteria	---	0.1	0.25	0.5
	Calculated	---	0.1	0.4	0.5
Uniformity	Criteria	20:1	20:1	15:1	10:1
	Calculated	15:1	10.5:1	4:1	2.25:1
Luminaire Type		Type V	Type V	Type V	Type V
Lamp (metal halide)		70 W	150 W	15 0 W	250 W
Pole Height		25 ft	25 ft	30 ft	35 ft
Spacing		60 ft x90 ft	100 ft x80 ft	75 ft x70 ft	60 ft x60 ft

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Allowed Lighting Power Table

	LZ1	LZ2	LZ3	LZ4
Lighting Power Density	0.040	0.060	0.080	0.200

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Control Requirements Table

	LZ1	LZ2	LZ3	LZ4
Parking Area Pre-curfew	100%	100%	100%	100%
Parking Area Post-curfew	10%	50%	50%	50%

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